INTERNATIONAL STANDARD

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Road vehicles — Tachograph systems —

Part 6:
Diagnostics

Véhicules routiers — Systèmes tachygraphes —

Partie 6: Diagnostic

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16844-6 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 16844 consists of the following parts, under the general title *Road vehicles — Tachograph systems*:

— *Part 1: Electrical connectors*

— *Part 2: Recording unit, electrical interface*

— *Part 3: Motion sensor interface*

— *Part 4: CAN interface*

— *Part 5: Secured CAN interface*

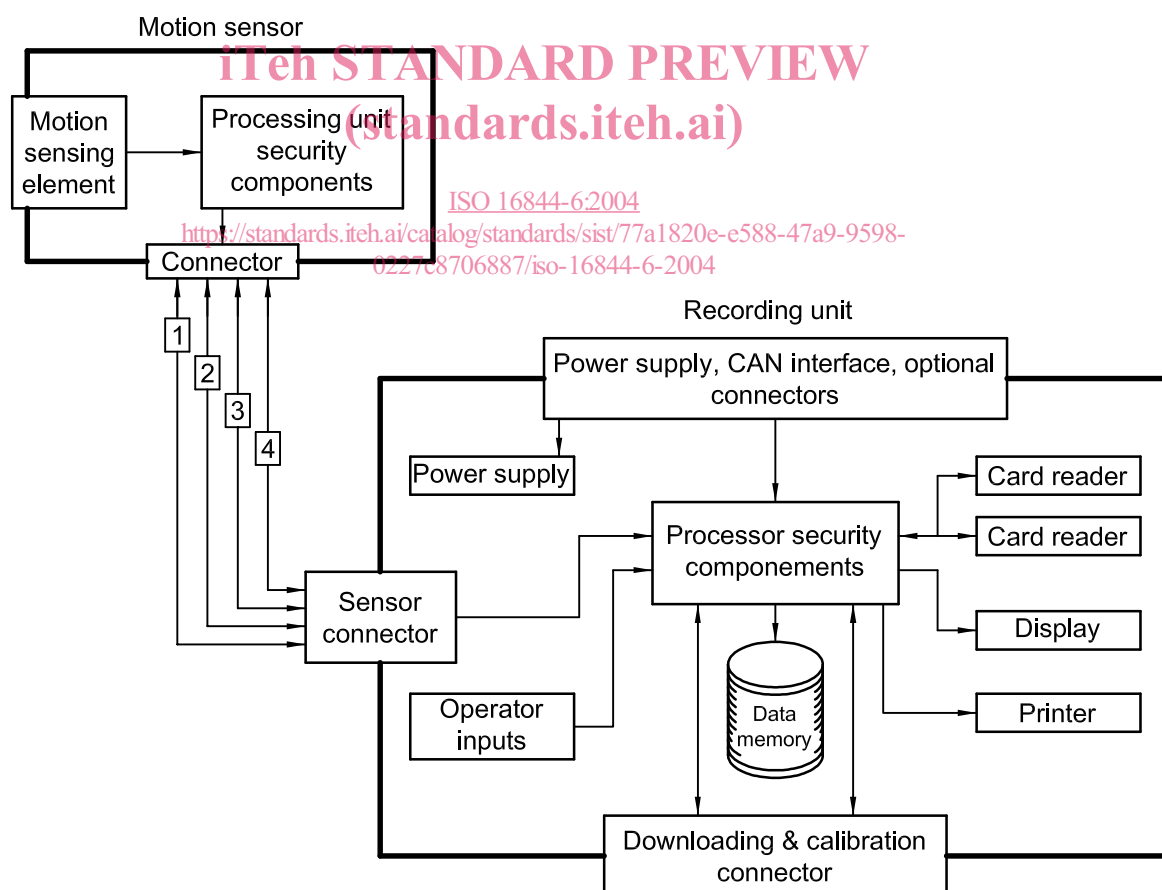— *Part 6: Diagnostics*

— *Part 7: Parameters*

Introduction

ISO 16844 supports and facilitates the communication between electronic units and a tachograph; the tachograph being based upon Council Regulations (EEC) No. 3820/85 [1] and (EEC) No. 3821/85 [2] and their amendments Council Regulation (EEC) No. 2135/98 [3] and Commission Regulation (EC) No. 1360/2002 [4].

Its purpose is to ensure the compatibility of tachographs from various tachograph manufacturers.

The basis of the digital tachograph concept is a recording unit (RU) that stores data related to the activities of the drivers of a vehicle on which it is installed. When the RU is in normal operational status, the data stored in its memory are made accessible to various entities such as drivers, authorities, workshops and transport companies in a variety of ways: they may be displayed on a screen, printed by a printing device or downloaded to an external device. Access to stored data is controlled by a smart card inserted in the tachograph.

In order to prevent manipulation of the tachograph system, the speed signal sender (motion sensor) is provided with an encrypted data link.

A typical tachograph system is shown in Figure 1.

Key

1	positive supply	3	speed signal, real time
2	battery minus	4	data signal in/out

Figure 1 — Typical tachograph system

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Road vehicles — Tachograph systems —

Part 6:
Diagnostics

1 Scope

This part of ISO 16844 specifies diagnostic communication and services in tachograph systems used in road vehicles, for both the controller area network (CAN) and K-line communication modes. It is also applicable for programming purposes.

NOTE   The diagnostic services base according to ISO 14229-1 and most services are common to the two communication modes, CAN and K-line. With CAN, however, there is no need for a service to start the communication, as the electronic control unit (ECU) always starts in the standard diagnostic session.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11898-1, *Road vehicles — Controller area network (CAN) — Part 1: Data link layer and physical signalling*

ISO 14229-1, *Road vehicles — Unified diagnostic services (UDS) — Part 1: Specification and requirements*

ISO 14230-1, *Road vehicles — Diagnostic systems — Keyword Protocol 2000 — Part 1: Physical layer*

ISO 14230-2, *Road vehicles — Diagnostic systems — Keyword Protocol 2000 — Part 2: Data link layer*

ISO 15765-2, *Road vehicles — Diagnostics on Controller Area Networks (CAN) — Part 2: Network layer services*

ISO 15765-3, *Road vehicles — Diagnostics on Controller Area Networks (CAN) — Part 3: Implementation of unified diagnostic services (UDS on CAN)*

ISO 16844-7, *Road vehicles — Tachograph systems — Part 7: Parameters*

3 Abbreviated terms

Cvt.   convention

M   mandatory

U   user option

C   conditional

4   Overview and conventions

4.1   Overview

Figure 2 shows the tachograph diagnostic communication links and their layers, based on the OSI (open systems interconnection) model.

NOTE   The download protocol specification is not covered by this part of ISO 16844.
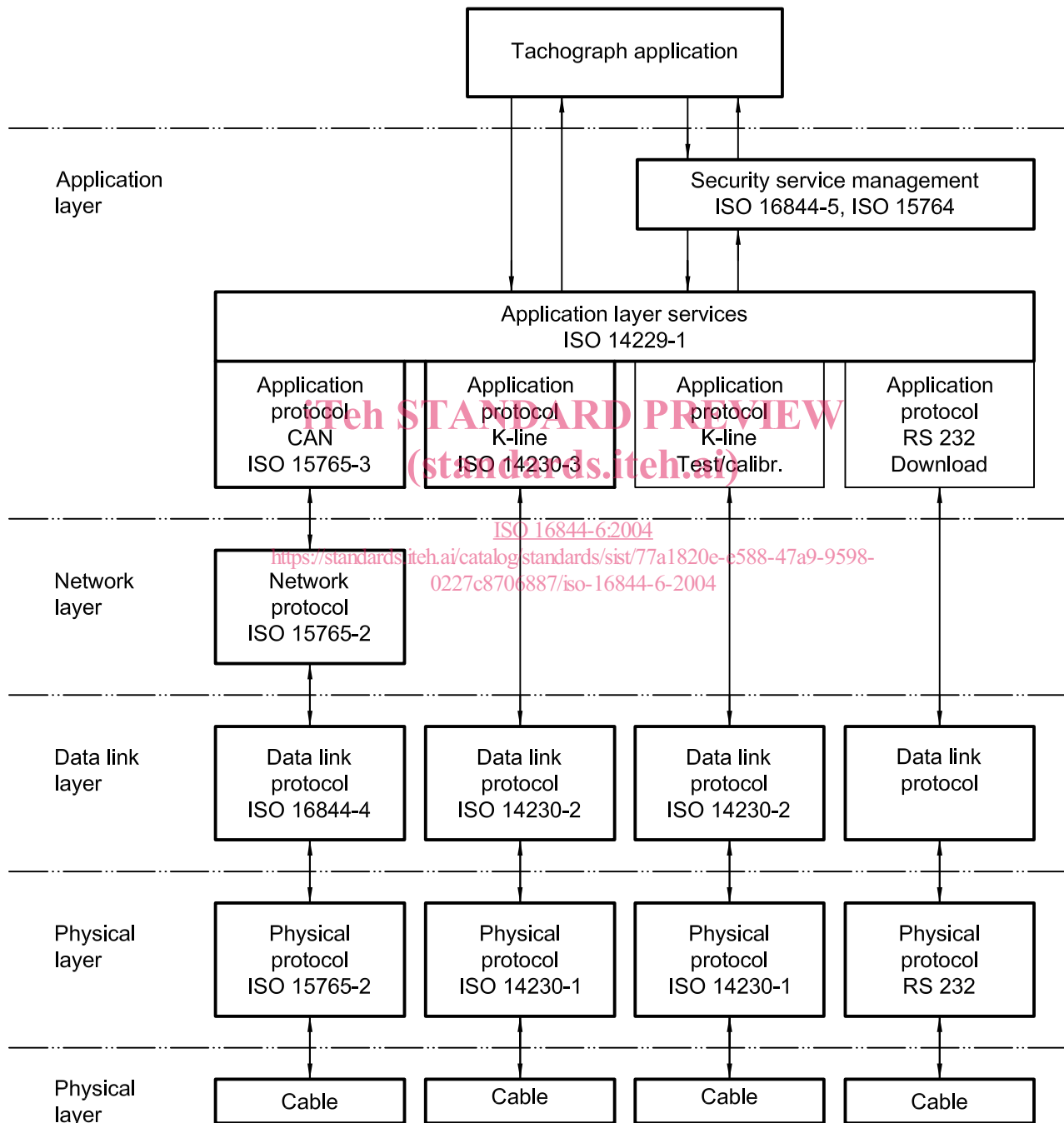

Figure 2 — Tachograph diagnostic communication links

4.2 Service description conventions

The service description conventions according to ISO 14229-1 shall be used.

5 Application layer services

The application layer services shall be implemented according to ISO 14229-1.

6 Application layer protocol

6.1 General

The application layer protocol shall be implemented according to ISO 15765-3 or ISO 14230-2, or both, as well as according to the additional requirements of this clause.

6.2 Application layer timing

6.2.1 Timing parameters for CAN

For CAN, using the data link layer in accordance with ISO 11898-1, the ECU(s) shall respond to a request message within $P2_{CAN}$. The application timing parameter values for CAN and their requirements shall be in accordance with Table 1.

Table 1 — Application layer timing parameters for CAN

Parameter	Value ms		Description/Requirement
	min.	max.	
$P2_{CAN}$	0	100	Time between request message and the receipt of all unsegmented response messages and all first frames of segmented response message(s). Each ECU shall start sending its response message within $P2_{CAN}$ after the request message has been correctly received.
$P2^*_{CAN}$	0	5 000	Time between the successful reception of a negative response message with response code 78_{hex} and the next response message (positive or negative message).

6.2.2 Timing parameters for K-line

The normal timing parameter, set in accordance with ISO 14230-2 (K-line), shall apply, using the data link layer according to 8.2.

7 Network layer (CAN only)

7.1 General

This clause is applicable only when the data link layer in accordance with ISO 11898-1 (CAN) is used.

The network layer shall be implemented in accordance with ISO 15765-2, and according to the additional requirements of 7.2.

NOTE   The testerPresent service must be executed in parallel with another ongoing service.

7.2   Communication parameters

The parameter N_WFTmax shall be set to 0, meaning "No FlowControl wait frames are allowed".

The time parameter N_Br shall be < 100 ms.

The time parameter N_Cs shall be < 100 ms.

8   Data link layer

8.1   CAN data link layer

8.1.1   General

The CAN data link layer shall be used with the physical layer according to 9.1.

The data link is shared by the application layer specified in ISO 16844-4 and the diagnostic communication specified in this part of ISO 16844.

8.1.2   Protocol

The protocol used shall be in accordance with ISO 16844-4.

8.1.3   Address coding method

The address coding method "Normal fixed addressing", in accordance with ISO 15765-2, shall be used.

8.2   K-line data link layer

8.2.1   General

The K-line data link layer shall be used with the physical layer according to 9.2.

The requirements given in ISO 14230-2 shall apply, together with the restrictions given in 8.2.2 and 8.2.3 of this part of ISO 16844.

8.2.2   Key bytes

Only the key word 2026 shall be used.

8.2.3   Initialisation

Only the fast initialisation shall be used.

8.2.4   Timing

The normal timing parameter set according to ISO 14230-2 shall apply.

9   Physical layer

9.1   CAN physical layer

The physical layer used for diagnostic communication on CAN shall be accordance with ISO 16844-4.

9.2 K-line physical layer

9.2.1 General

Additional to the CAN physical layer, the K-line physical layer in accordance with ISO 14230-1 may also be used.

9.2.2 Configuration

Only K-line shall be used.

10 Addresses

10.1 General

All ECUs shall be able to respond to both functional and physical diagnostic addresses.

10.2 Functional addresses

The recording equipment shall respond to the functional address 238 as the system address and the functional address 255 addressing all ECUs in the vehicle.

10.3 Physical addresses

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Each ECU that is part of the recording unit shall have a physical address. The specific ECU containing the data memory for recorded data shall have the address 238. All other addresses shall be vehicle-manufacturer-specific.

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11 Parameters

If a parameter value or a record value consists of more than one byte, the most significant byte shall always be transmitted first, followed by bytes of decreasing significance.

12 Diagnostic services

12.1 General and overview

The diagnostic services shall be in accordance with ISO 14229-1 and with Table 2, which gives a summary and an overview of all diagnostic services that may be available in the tachograph — specifying which sessions and services are mandatory in the tachograph and in which diagnostic sessions the diagnostic services are to be used.

Additional tachograph requirements, subfunctions, parameters and conventions of the diagnostic services are given in 12.2 to 12.7.